The Role of Modeling and Simulation in the Evaluation of FCS: OneSAF, NETS, and DETES

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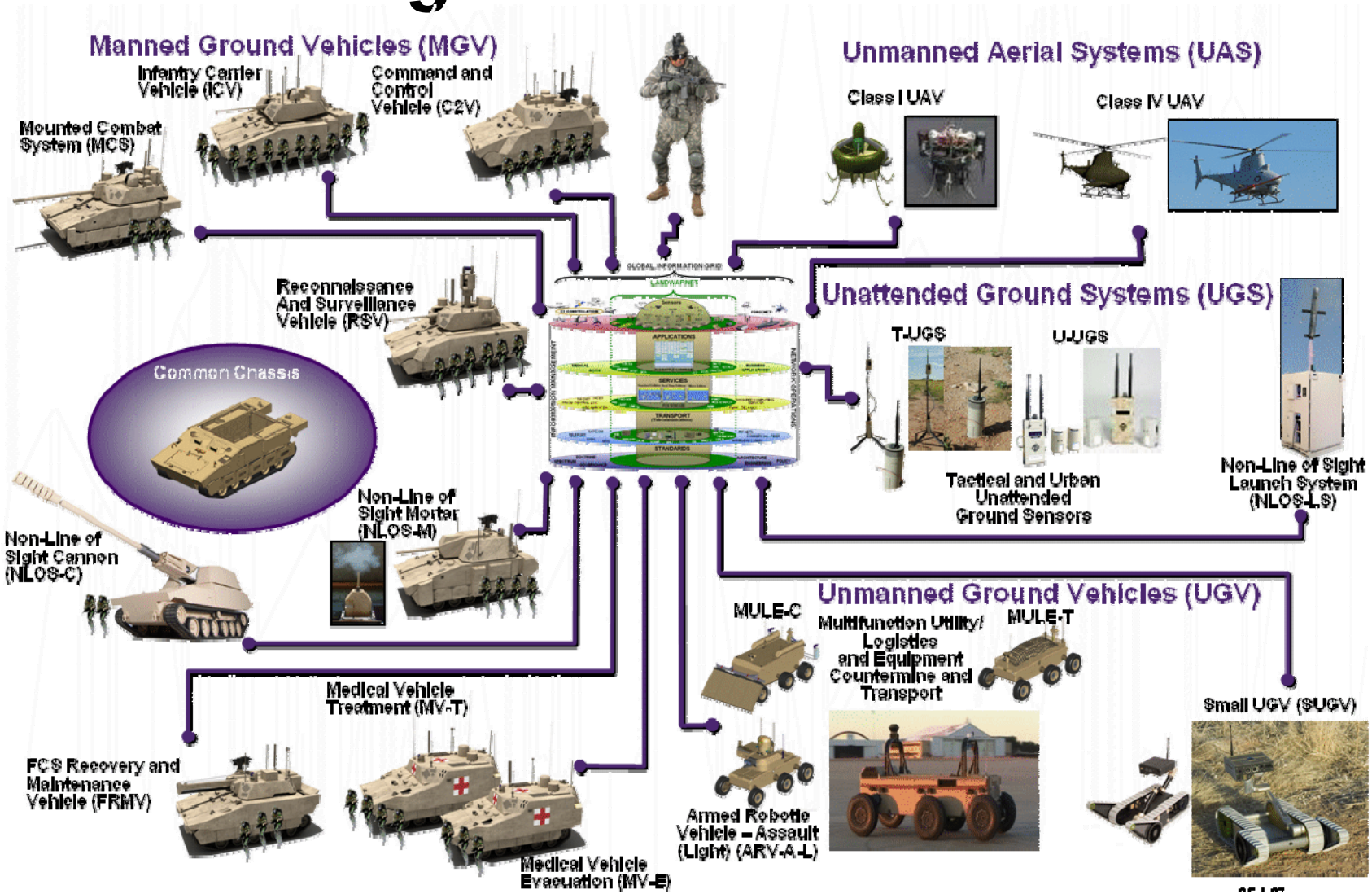
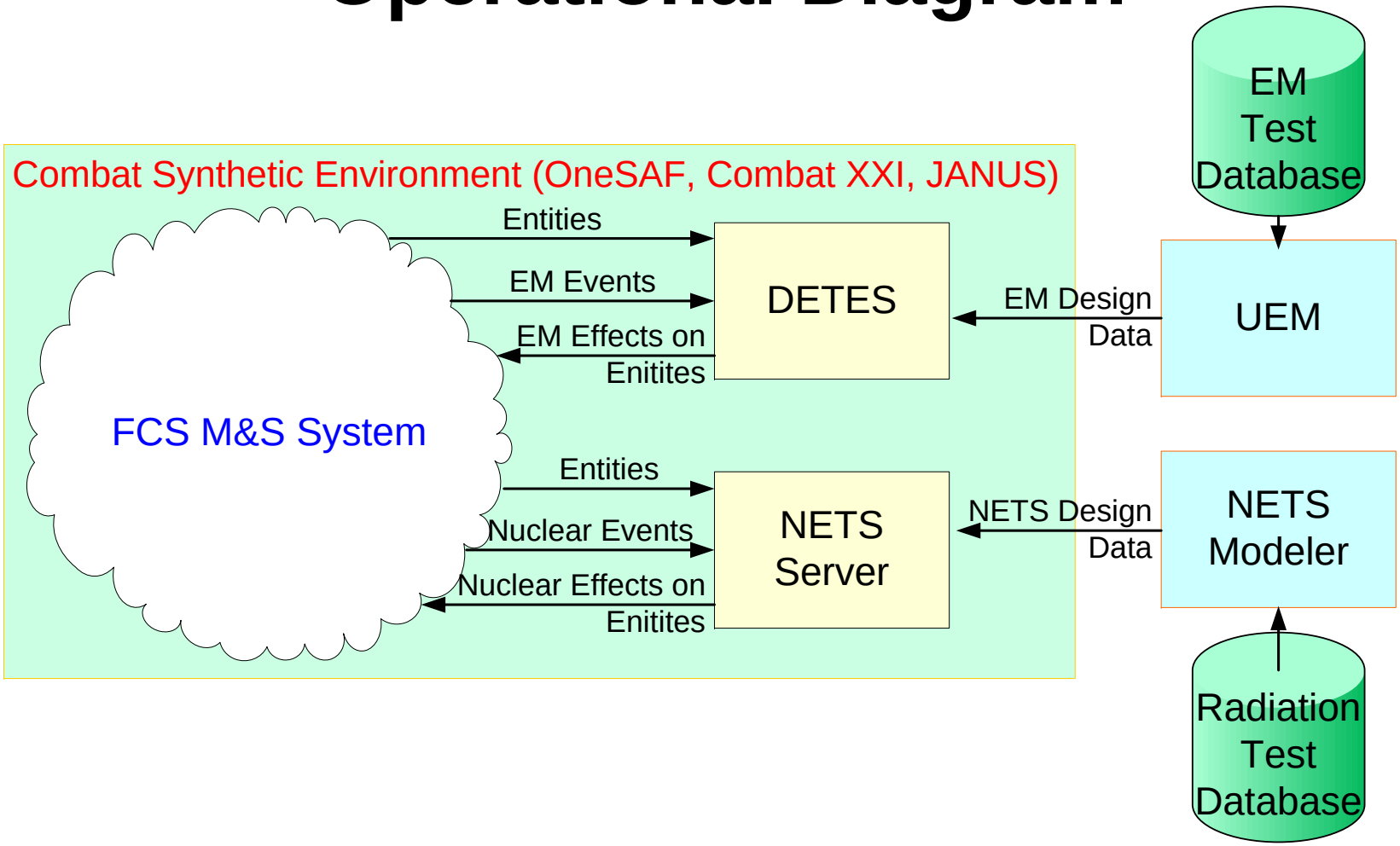
Motivation for M&S

- FCS is a system-of-systems (SoS)
- Evaluation required at SoS level
- Evaluation relies on modeling & simulation
- Response to environment stresses need to be represented in simulations
  - Initial Nuclear Radiation (INR) effects
    - Prompt, secondary, and delayed gammas
    - Prompt and delayed neutrons
  - EM effects
    - High Altitude Electromagnetic Pulse (HEMP)
    - High Powered Microwaves (HPM)
    - Near lightning strikes (LEMP)

FCS Brigade Combat Team...

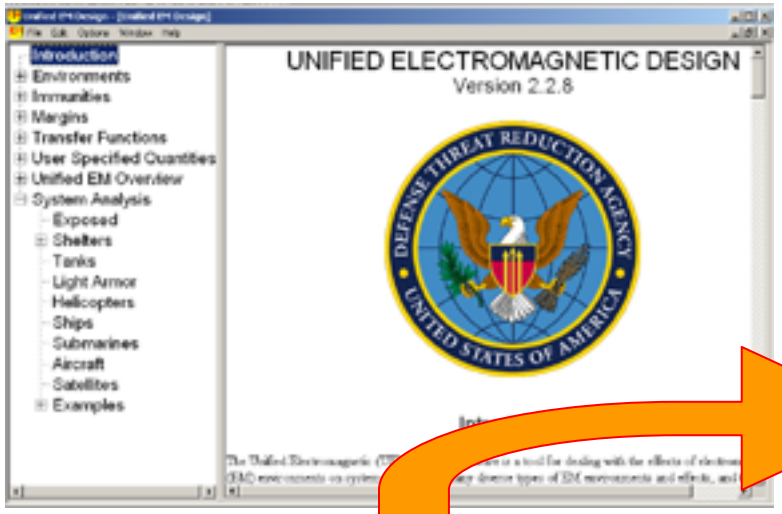


NETS / DETES Operational Diagram

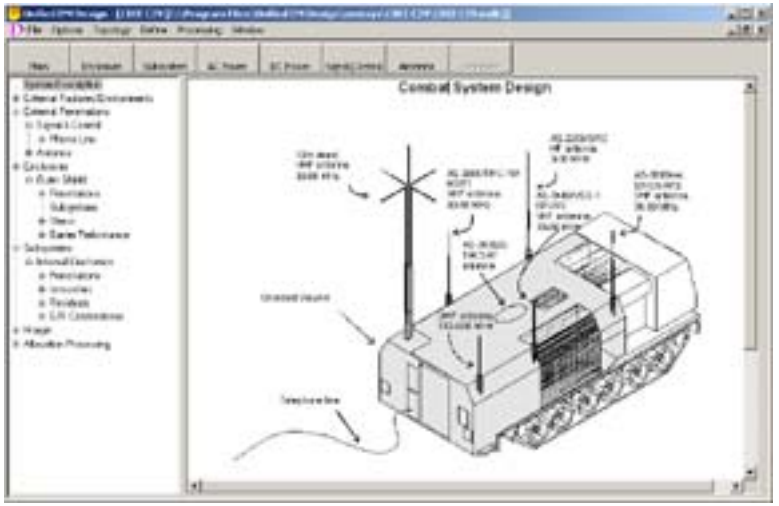


DETES Functional Flow (1)

UEM Design Main



Create System Model



UEM Information Database

UEM User's Information Database

- Environments
- Immunities
- Margins
- Transfer Functions

UEM System Model Database

- Environments
- Immunities
- Margins
- Transfer Functions
- Topology
- Barrier Performance

FUTURE COMBAT SYSTEMS
FCS
One Team – The Army/DARPA/Industry

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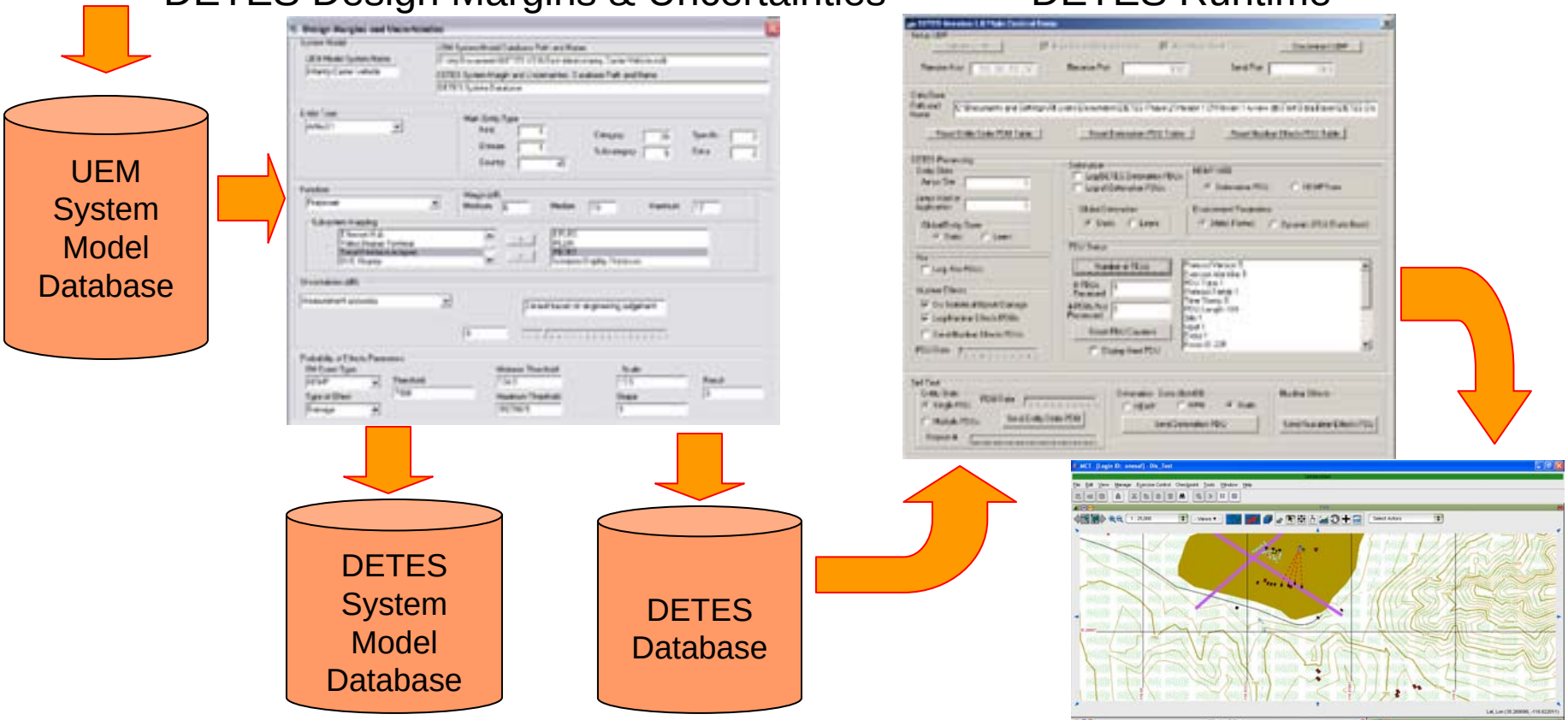
DETES Functional Flow (2)

DETES Design Margins & Uncertainties

DETES Runtime



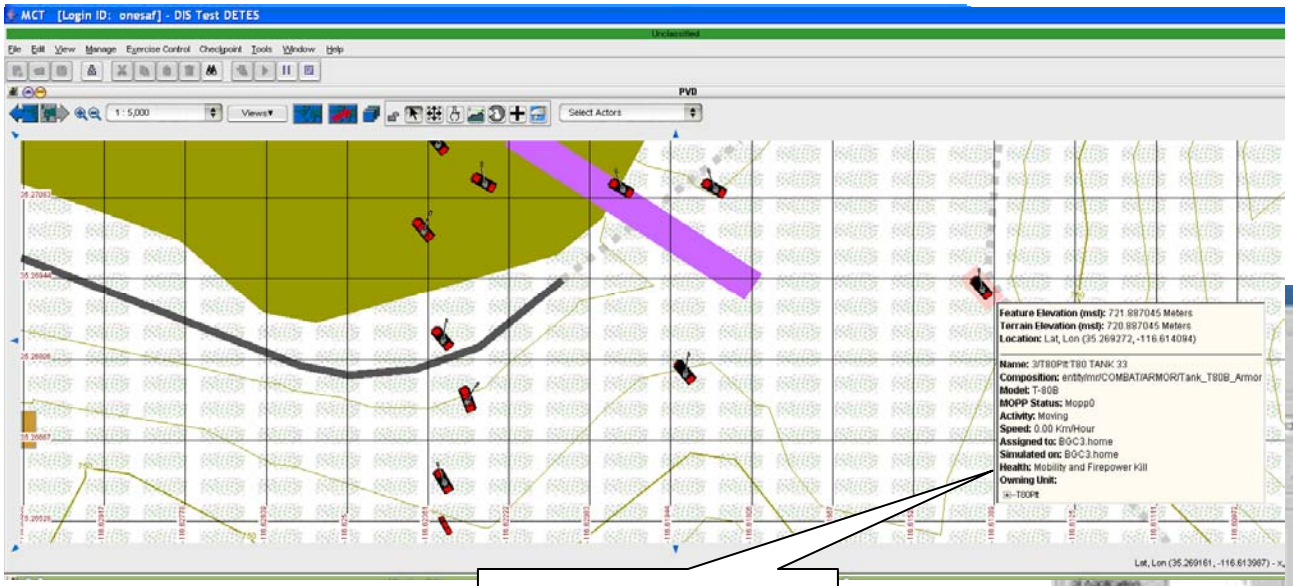
- Subsystem/Functional Relationships
- Actual Design Margins
- Uncertainties

Probability of Effect Parameters

OneSAF

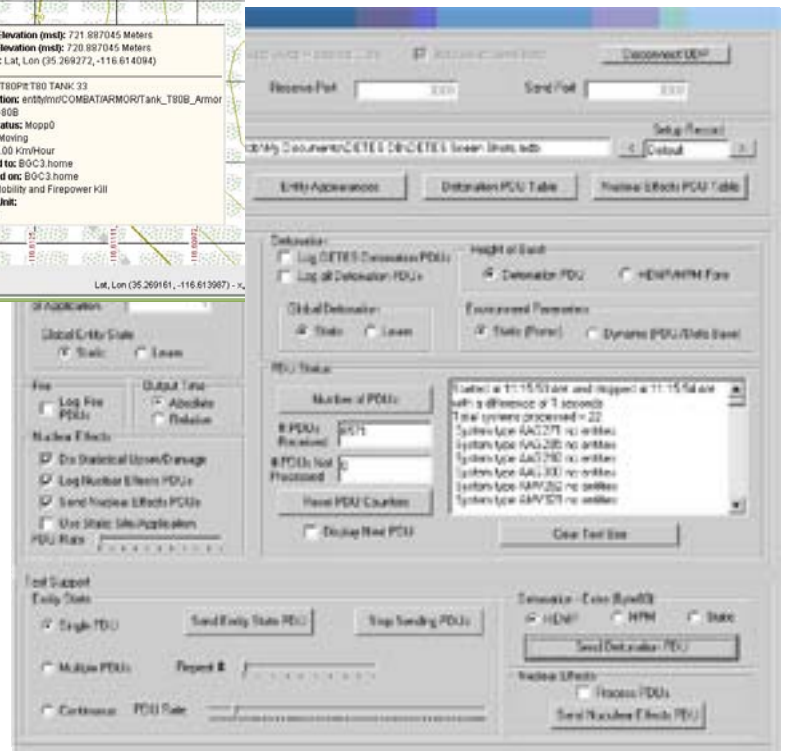
FUTURE COMBAT SYSTEMS FCS One Team – The Army/DARPA/Industry

Example DETES Interop with OneSAF



Mobility & Firepower Kill

DETES Runtime



Summary

- FCS is a system-of-systems (SoS)
- Success determined SoS level
- Evaluation relies on modeling & simulation
  - Models must be VV&A'd
  - Use of test data from parts to system level
- Response to environment stresses need to be represented in simulations
  - NETS provides models for INR effects on system electronics in battlefield simulations
  - DETES provides models for EM effects on system electronics in battlefield simulations